REMARKS

Claims 1-16, all the claims pending in the application, stand rejected.

Claim Rejections - 35 U.S.C. § 103

Claims 1-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Maher et al (6,647,020). This rejection is traversed for at least the following reasons.

The Examiner's Rejection

The Examiner has repeated the text of the previous rejection of claims 1-16. In particular, the Examiner references a teaching in Fig. 1 of a **plurality of terminals** (148, 150, 152, 154, 156), one of which is a master terminal, and asserts that each terminal is associated with a particular site and **local routers** 108 and 110 for supporting multicast services. The Examiner asserts that the Zone controller 116 acts as the claimed "**route server**" and is in communication with the plurality of the local routers. Finally, the Examiner asserts that the Zone controller 116 is for (1) establishing IP multicast and (2) maintaining and dynamically assigning multicast control addresses to control message transmission between participating multicast groups, i.e. in a Zone (col. 8, lines 28-60).

The Examiner admits that Maher et al fails to teach that the network 100 in Fig. 1 includes mesh TDMA satellites, but asserts that one of ordinary skill would be motivated to incorporate a mesh satellite connection into the network of Fig. 1 in order to expand coverage.

Response to Arguments

As a preliminary matter, Applicant reiterates that the invention has the following features:

(1) the provision of internet protocol (IP) multicast services on a mesh satellite network where all terminals can communicate with each other on a single satellite hop;

(2) the use of plural terminals (34, 36), each coupled to at least one router (52-58), where each terminal does not require support for multicast IP routing in the mesh satellite network;

(3) the use of a common router server (40) that (a) is in periodic communication on a one-hop basis via multicast routing packets with all terminals to obtain and distribute routing information to any router(s) coupled to each terminal and (b) creates and stores multicast group table information for all routers in a master routing table (Fig. 2),

(4) whereby satellite bandwidth and CPU/memory resources are efficiently utilized, as explained at page 7, line 8:

> ...as shown in Fig. 4, the present invention allows for a reduction in the number of slots required for routing information updates (i.e., to slots 1 and 5). This reduction occurs due to the fact that the routing information is exchanged only between each router and the RS 40 [route server] and not between all routers.

Claim 1 defines the invention as a system for IP multicast services in a mesh satellite TDMA network. The mesh satellite TDMA network is the best known type of system within which the invention makes sense because of the possibility of one hop communication and the bandwidth savings that can be achieved. The claimed system has:

- a plurality of terminals for providing IP multicast services;
- a route server for establishing and maintaining routing information for a plurality of routers, and
- a controller operative to allocate broadcast bursts to the terminals based on requests from the terminals via said route server.

The requirement for establishing and maintaining the routing information for a plurality of routers emphasizes the distinctive feature of the invention that the route server (1) receives routing information from individual routers, (2) establishes the optimum routes, and (3) maintains the routing information for repeated multicast calls through the network, subject to update information sent from the individual routers. Moreover, the type of information is important, as the routing information in the present invention relates to an identification of satellite routes, required hops and time slots for multiple calls. This information is established

and distributed independent of whether the particular terminal is active, as it is intended to establish the available connectivity among routers for any future multicast communications. It is the local routers that are employed to establish a connection for a given call when the call is placed, independent of the intervention of the route server.

In sum, Applicant's system is concerned with a mesh-type, TDMA-based wireless network and the connectivity within the network is defined and maintained by a route server that is establishes routing for various sites in the TDMA wireless network. According to the invention, the routing information is defined by the route server and is made available at the local routers to enable them to communicate among each other. Significantly, that communication among terminals is enabled independently of any instant action of the route server. This is in direct contrast to the function of the the zone controller 116 in Maher et al, which operates to establish routes for each call, on a call-by-call basis, and must be involved with every call.

Maher's Zone Controller 116 Is Not a Router Server

In the Examiner's analysis supporting his rejection of claims 1-16, the Examiner looks to Maher et al, particularly Fig. 1, for an illustration of a plurality of terminals each connected to a router, and to what the Examiner characterizes as a "route server." The flaw in this part of the Examiner's analysis is that there is no "route server" in Maher et al, having the conventional meaning in the art or the capability as claimed, that is, a device that establishes and maintains the routes that are to be used by clients.

First, with reference to the term "route server," the definitions from Newton's Telecom Dictionary states :

> ROUTE SERVER An ATM term. A physical device that runs one or more network layer routing protocols, and which uses a route query protocol in order to provide network layer routing forwarding descriptions to clients. (emphasis added)

Second, as explained, the route server is operative to establish and maintain the content of a master routing table. The Newton's Telecom Dictionary defines the routing table as having three meanings, the first two dealing with phone calls and the third as follows:

ROUTING TABLE 3. In data communications, a routing table is a table in a router or some other internetworking device that keeps track of routes (and, in some cases, metrics associated with those routes) to particular network destinations. See Routing Metric

ROUTING METRIC
The method by which a routing algorithm determines that one route is better than another. This information is stored in routing tables. Such tables include reliability, delay bandwidth, load, MTUs, communication costs, and hop count.

The use of a router server, having a central master routing table with the foregoing characteristics, is a unique feature of the present invention that is not found in Maher et al.

In Maher et all, all of the routers (108, 110, 112) will exchange routing information in the same manner as in the conventional art (col. 9-10: "The routers 108-114 may comprise, for example, 3Com "NetBuilder" series routers."). Even the core router 114, which serves as a node in a hub-and-spoke architecture to distribute broadcast messages to the other routers, must exchange that information with all other routers.

The Examiner looks to the Zone controller 116 as the route server. However, this is simply a conventional server that controls a conventional hub router 114 and is not the source of route information for distribution to all routers in the network. The function of the Zone controller 116, as explained at col. 5, line 66-col. 6, line 26, is to dynamically assign and manage respective payload and control IP multicast addresses for payload, and to control messages between and among participating talk group members at the various sites. As stated at lines 4-8, the multicast group addresses for particular talk groups are identified and assigned on a call-by-call basis.

The Zone controller 116 manages and dynamically assigns IP multicast addresses for payload (voice, data, video, etc.) and control messages between and among the various sites 102, 104, 106. The multicast group addresses are identified and assigned on a call-by-call basis by the Zone controller 116. However, the routing pertaining to the IP multicast addresses are maintained by the routers 108-114 forming the network 100 (see col. 5, line 66 - col. 6, line 26). This distributed routing information based on the conventional "spanning tree" that is adopted by the reference, defines all of the router interfaces which contains group members and the

necessary routes for providing the multicast capability. The Zone controller 116 does not retain tables of routing information for the entire router network in lieu of each router maintaining and managing its own routing information on the basis of exchanges with other routers.

The Zone controller 116 merely establishes and ends talk group calls on a call-by call basis, that is "setting up and ending talkgroup calls" for a specific, instant need, that is, a specific 'route' for use by a specific call.

This relationship to a specific call in a talkgroup is emphasized numerous times throughout the specification in Maher et al, including all disclosed embodiments:

Col 2, lines 41-44:
"In one embodiment of the present invention, there is provided a method utilizing a payload multicast group address for distributing payload to participating devices in a talkgroup call."

Col 2, lines 55-59:
"In another embodiment of the present invention, there is provided a method utilizing a control multicast group address for distributing control messages to participating devices in a talkgroup call."

Col 3, lines 1-3:
"In still another embodiment of the present invention, there is provided a method for distributing communication information between members of a talkgroup distributed among different zones."

Col 3, lines 16-19:
"In yet another embodiment of the present invention, there is provided a communication system operable to implement a talkgroup call using a payload multicast group address."

Col 3, lines 36-40:
"In still yet another embodiment of the present invention, there is provided a communication system using a control multicast group address for sending control messages to members of a talkgroup call."

Col 3, lines 55-58:
"In a still further embodiment of the invention, there is provided a multi-zone communication system operable to implement a talkgroup call."

The previously cited example of Zone controller 116 being actively involved in each call and not being a route server is provided at col. 7, lines 29-46. Clearly, this description is of a

direct communication between routers and not via a route controller as in the present invention. Moreover, as previously stated, the connection established by the Zone controller 116 is on a call-by-call basis (col. 6, lines 4-8; col. 8, lines 45-51) and does not represent the communication of routes maintained by a route server, as claimed.

Maher Fails to Teach a Mesh TDMA Satellite Network

Finally, the Examiner's dismissal of the limitation to a mesh TDMA satellite network ignores a key limitation of the claims and ignores the significant advantages of the invention in that specific network environment.

First, the present application expressly distinguishes the mesh system from other types of systems (i.e., hub-spoke) using multicast protocols (such as DVMRP and PIM-SM) at pages 2 and 3 of the specification. The application states at page 3 that "IP multicast has not been publicly deployed on mesh satellite networks," a statement that was made for at least the reason that the coordination of routing information is exceedingly complex and too inefficient. In short, the challenge to providing an efficient multicast system has been met by Applicants' invention, and that advance in a mesh system environment cannot be casually dismissed.

Second, Maher et al does not contemplate a mesh type network, by the Examiner's own admission. Had the application of Maher to a broader class of satellite networks been obvious, at least a mention of mesh satellite TDMA would have been provided.

Third, Maher et al teaches away from the mesh-type network, as even Maher's more complex system illustrated in Fig. 6 uses separate zone controllers 630, 632 and couples the core routers 614, 620 via a T-1 line or E-1 digital carrier (col. 11, lines 1-5). Clearly, Maher et al contemplates a plurality of independent zones of the hub and spoke type, which themselves communicate by dedicated line and are totally incompatible with TDMA communication in a mesh environment. The brief mention of TDMA slots as a "suitable wireless communication medium" does not support a conclusion that the arrangement recited in the claims would be obvious.

Finally, there is no recognition in Maher et al of the advantages of the present invention that are unique to TDMA, particularly the economies achievable in TDMA slot usage for

overhead purposes. The silence of the reference in this regard demonstrates that the use of a router controller as claimed was never considered by Maher nor would it be obvious over Maher.

Claims 2-13

As to the dependent claims 2-13, the Examiner's analysis does not remedy the basic defect in the teachings of the two main prior art references.

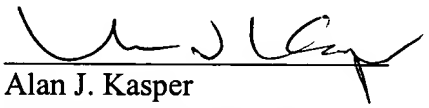
Claims 14-16

The features of method claims 14-16 are consistent with the foregoing arguments and support patentability of these claims as well.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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